

Claims:

Cancel the claims 1-19 and substitute new claims 20-38 as follows:

Claims 1-19 (canceled)

Claim 20 (new): A multichannel filter-based handheld ultra Wideband (UWB) communication transmitter comprising:

 A convolution encoder coupled to a block interleaver;

 the block interleaver coupled to a multichannel pseudorandom (PN) sequence mapping;

 the multichannel PN sequence mapping coupled to a digital UWB transmitter filter system;

 the digital UWB transmitter filter system coupled to a digital-to-analog (D/A) converter;

 the D/A converter coupled to a multichannel-based multicarrier modulator;

 the multichannel-based multicarrier modulator coupled to a power amplifier (PA);

 a PN sequence look-up table coupled to the multichannel PN sequence mapping;

 a multichannel control coupled to the multichannel PN sequence mapping and coupled to the multichannel-based multicarrier modulator; and

 a clock control coupled to the digital UWB transmitter filter system, the D/A converter, and the multichannel-based multicarrier modulator.

Claim 21 (new): The multichannel filter-based handheld UWB communication transmitter of claim 20 wherein the digital UWB transmitter filter system is used to generate multichannel UWB signals for outdoor operations.

Claim 22 (new): The multichannel filter-based handheld UWB communication transmitter of claim 20 wherein said digital UWB transmitter filter system can produce a set of transmitted data rates with scalability by controlling multichannel UWB signals.

Claim 23 (new): The multichannel filter-based handheld UWB communication transmitter of claim 20 wherein said digital UWB transmitter filter system is either a digital UWB FIR lowpass-shaping filter or a digital UWB cascaded FIR lowpass-shaping filter.

Claim 24 (new): The multichannel filter-based handheld UWB communication transmitter of claim 23 wherein the digital UWB FIR lowpass-shaping filter further comprises

- a lowpass band 0 - 0.26 (GHz);
- a first transition band 0.26 - 0.325 (GHz);
- a second transition band 0.325 - 0.39 (GHz);
- a third transition band 0.39 - 0.45 (GHz); and
- a stop band 0.45 - 0.5 (GHz).

Claim 25 (new): The multichannel filter-based handheld UWB communication transmitter of claim 24 wherein said digital UWB FIR lowpass-shaping filter has 83 filter coefficients.

Claim 26 (new): The multichannel filter-based handheld UWB communication transmitter of claim 23 wherein said digital UWB cascaded FIR lowpass-shaping filter includes a digital UWB multiband FIR lowpass-shaping filter and a digital UWB FIR rejected lowpass filter.

Claim 27 (new): The multichannel filter-based handheld UWB communication transmitter of claim 26 wherein said digital UWB multiband FIR lowpass-shaping filter is created by a digital UWB enlarged FIR lowpass shaping filter of inserting a zero in between the filter coefficients.

Claim 28 (new): The multichannel filter-based handheld UWB communication transmitter of claim 27 wherein said digital UWB enlarged FIR lowpass shaping filter comprises:

- a lowpass band 0 - 0.512 (GHz);
- a first transition band 0.512 - 0.65 (GHz);
- a second transition band 0.65 - 0.78 (GHz);
- a third transition band 0.78 - 0.9 (GHz); and
- a stop band 0.9 - 1.0 (GHz).

Claim 29 (new): The multichannel filter-based handheld UWB communication transmitter of claim 28 wherein said digital UWB enlarged FIR lowpass shaping filter has 51 filter coefficients.

Claim 30 (new): The multichannel filter-based handheld UWB communication transmitter of claim 26 wherein said digital UWB FIR rejected lowpass filter has frequency bandwidths comprising:

- a lowpass band 0 - 0.28 (GHz);
- a transition band 0.28 - 0.7 (GHz); and
- a stop band 0.7 - 1.0 (GHz).

Claim 31 (new): The multichannel filter-based handheld UWB communication transmitter of claim 30 wherein said digital UWB FIR rejected lowpass filter has 10 filter coefficients.

Claim 32 (new): The multichannel filter-based handheld UWB communication transmitter of claim 23 wherein the digital UWB FIR lowpass-shaping filter and the digital UWB cascaded FIR lowpass-shaping filter can be used to generate equivalently transmitted signals, which meet an outdoor UWB transmitter spectrum mask.

Claim 33 (new): The multichannel filter-based handheld UWB communication transmitter of claim 23 wherein said multichannel control can control the multichannel-based multicarrier modulator to turn off anyone of the transmitting UWB channels during outdoor operations.

Claim 34 (new): The multichannel filter-based handheld UWB communication transmitter of claim 33 wherein said multichannel control coupled to said multichannel-based multicarrier modulator can be used to avoid the interference with Wireless Local Area Network (WLAN)

devices by not transmitting UWB signals on one and/or two transmitter channels.

Claim 35 (new): A multichannel filter-based handheld Ultra Wideband (UWB) communication receiver comprising:

- a lower noise amplifier (LNA) coupled to a multichannel-based multicarrier downconverter;
- the multichannel-based multicarrier downconverter coupled to an analog-to-digital (A/D) converter;
- the A/D converter coupled to a digital UWB multichannel receiver filter;
- the digital UWB multichannel receiver filter coupled to a Rake receiver that is connected with a channel estimator and an equalizer;
- the channel estimator coupled to the equalizer;
- the equalizer coupled to a despreading of pseudorandom (PN) sequence and demapping, which is connected to a block deinterleaver followed by a decoder;
- a synchronization and time control coupled to the multichannel-based multicarrier downconverter, the digital UWB multichannel receiver filter, and the Rake receiver;
- a PN sequence look-up table is coupled to the Rake receiver and the despreading of PN sequence and demapping; and
- a multichannel control is connected to the multichannel-based multicarrier downconverter and the despreading of PN sequence and demapping.

Claim 36 (new): The multichannel filter-based handheld UWB communication receiver of claim 35 wherein said digital UWB multichannel receiver filter has a filter spectrum mask, including a lowpass band, a first transition band, a second transition band, a third transition band, and a stop band.

Claim 37 (new): The multichannel filter-based handheld UWB communication receiver of claim 35 wherein said digital UWB multichannel receiver filter is either a digital UWB lowpass FIR filter or a digital UWB cascaded lowpass FIR filter.

Claim 38 (new): The multichannel filter-based handheld UWB communication receiver of claim 35 wherein said digital UWB multichannel receiver filter can be used to filter all of multichannel UWB signals at different multicarrier frequencies.